HEINZMANN®

Digital control range for steam turbine generators

Si-TEC *Xtend* CGC

DATA SHEET

Models

Si-TEC *Xtend* CGC Turbine Control is available in 4 variations:

CGC-T
Condensing/Backpressure Turbines

CGC-TS
Condensing Turbines – Split Range Actuators *

CGC-TSX
Condensing Turbines – Split Range Actuators & Extended I/Os **

CGC-SST
Condensing/Backpressure Turbines – Split Shaft ***

Description

Si-TEC (Smart Integrated Turbine & Engine Control) is the world's only digital governor fully integrated with an automatic synchroniser and kW/kVAr control, and was developed by Dawson Technology Pty Ltd in 1991, which now operates under the name of Heinzmann Australia Pty Ltd as part of the HEINZMANN Group.

With more than 4000 systems now in operation throughout Australia, Asia & internationally, the Si-TEC *Xtend* control Provides a further enhancement of this already successful product.

Designed for use with all sizes of generator, the Si-TEC *Xtend* can be used for Islanded or Co-generation on a wide range of steam turbines including condensing, backpressure and controlled–extraction applications.

Key features

- Precise speed governing
- Dual MPU for redundancy
- Automatic turbine start sequence
- Driving wide range of actuators (incl. HEINZMANN all-electric)
- Wide range of PIDs
- Interfacing wide range of AVR systems
- Auto synchronising
- kW control & load share
- kVAr/PF control & load share
- Process control (inlet pressure)
- Actuator /valve linearization curves
- Flexible configuration
- User-friendly tuning software (PC tune)
- Extensive system diagnostics
- Optional I/O expansion

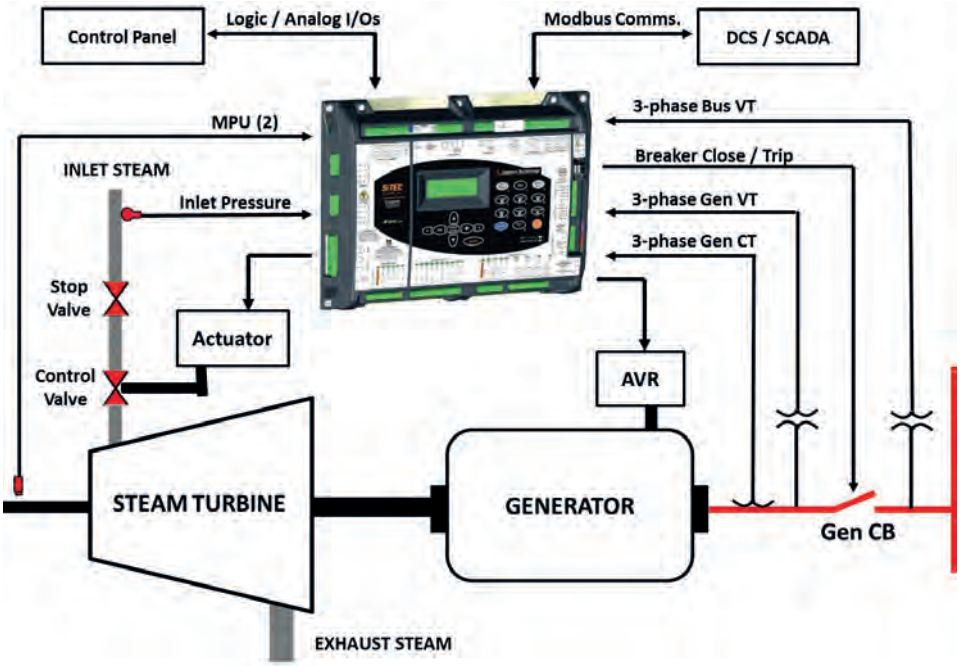
Features

- Precise speed governing typically within 0.1 % of operating (rated) speed at steady state
- Dual MPU (or prox.) speed sensors for redundancy
- Automatic start/stop sequence initiated by a single logic input to give fuel limited "Guaranteed Start®"
- Typically interfaces with all-electric actuators that provide "instantaneous" position feedback
- Capable of driving wide range of actuators including electro-hydraulic (e.g. 0-200 mA, 4-20 mA, 0-5 V, +/-10 V, etc.), electric, and pneumatic actuators
- Multi-point linearization curves for actuators
- Multiple and wide range PIDs (includes 6 x speed PIDs, kW PID, process PID, voltage bias control, synchronising control, kVAr/PF control, etc.)
- Extensive I/Os that may be expandable via CAN bus (e.g. remote digital I/Os, thermo-couples, multi-valve actuators for large turbine applications, etc.)
- Noise and harmonic issues eliminated by design
- 3-phase AC RMS voltage and current sensing
- Configurable alarms can be multi-functional
- Bump® feature to optimise tuning of governor
- Live display (via pcTune) of control overview (speed, kW & process control)
- Accumulated data recording of turbine running hours, kW hours, kVAr hours, etc.
- Extensive diagnostic functions
- Turbine monitoring via Opal Generator Annunciator
- *: CGC-TS – for dual actuator application
- **: CGC-TSX – for dual actuator application extended
- ***: CGC-SST – for Stal-Laval type turbine application

Application range

- Power generation applications where up to 24 generators can be paralleled together. Multiple groups can be combined via GSM (Generator System Master) modules.
- Single or multiple GSMs for more complex applications, eg, multiple bus and/or feeders and applications for more than 24 nodes
- Co-generation operation – parallel to the grid for:
  - Soft "bumpless" transfer of loads
  - Peak shaving – set max. limit for import power
  - Base Loaded to the grid
  - Export excess power to the grid
- Prime power – only export to grid
- Systems requiring high quality power based upon precise frequency and calculations of active and reactive power
- Generating sets in sugar, mining and general industry, mining sites and townships, rural & remote communities, hospitals, commercial buildings, marine & shipping, defence & telecommunications facilities as well as oil & gas industry

Si-TEC Xtend CGC turbine interface



Synchroniser

- Digitally integrated with governor
- Better than 10 secs (typically within 5 secs for 0.1 Hz, 1.0 % V & 5° phase match) for most applications
- Phase rotation check during synchronising (3-ph bus & gen check)
- Integrated independent "Sync Check" hardware
- Optional "Permissive" synchronising function
- Intelligent "Dead Bus" detection and closure
- Menu adjustable synchronising parameters

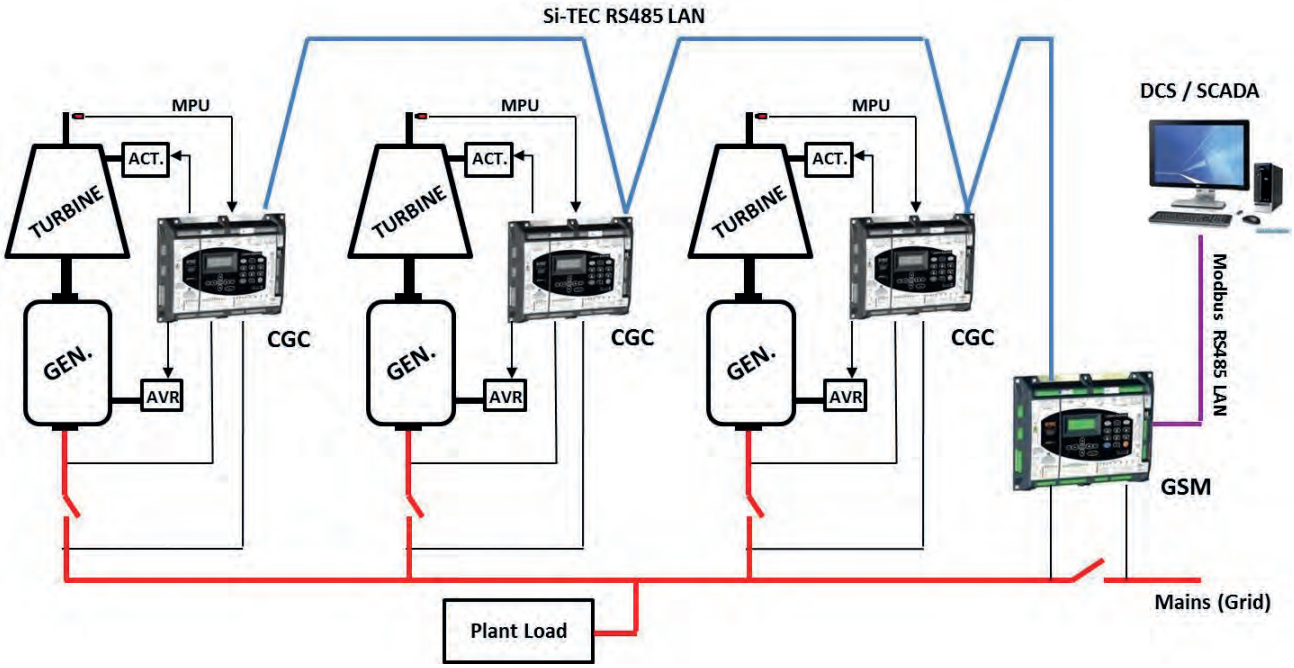
Load sharing and load control

- Digitally integrated with governor
- Automatic and isochronous (islanded) kW and kVAr load sharing
- Load sharing accuracy to better than 0.5 %
- True RMS AC measurement (3-phase voltage & current) better than 0.25 % accuracy
- Optimum control of active power (kWs) and reactive power (kVAr/PF) when grid paralleled
- "Bumpless" transfer of active and reactive power
- Mains/grid droop function for large turbine applications
- Process control (e.g. exhaust pressure control)
- Adjustable load/unload ramp rates
- Multi-mode kW & kVAr/power factor control
- AVR bias to directly interface wide range of AVRs (digital outputs or +/- 8.4 VDC) for PF sharing/control
- 4-20 mA and Modbus® RS485 referencing available
- Power factor or kVAr control when base loaded
- Vector disturbance feature senses loss of grid within 40 mSec to maintain full operation of station

Display features via opal turbine annunciator

- 4 x 20 character LCD display, with "back-light flash" feature for active alarms
- Metering of essential generator information (e.g. voltage, frequency, real power and power factor)
- Multiple "Short-Cut" keys to display useful data (e.g. peak hold, running hours, control status & alarms)
- Turbine monitoring parameters including inlet pressure, exhaust pressure, lube oil pressure, etc.
- Various alarms and shutdown conditions (e.g. low inlet, high exhaust, low lube oil, overspeed etc.)

Si-TEC Xtend CGC turbine used for mains (grid) parallel application



I/O features

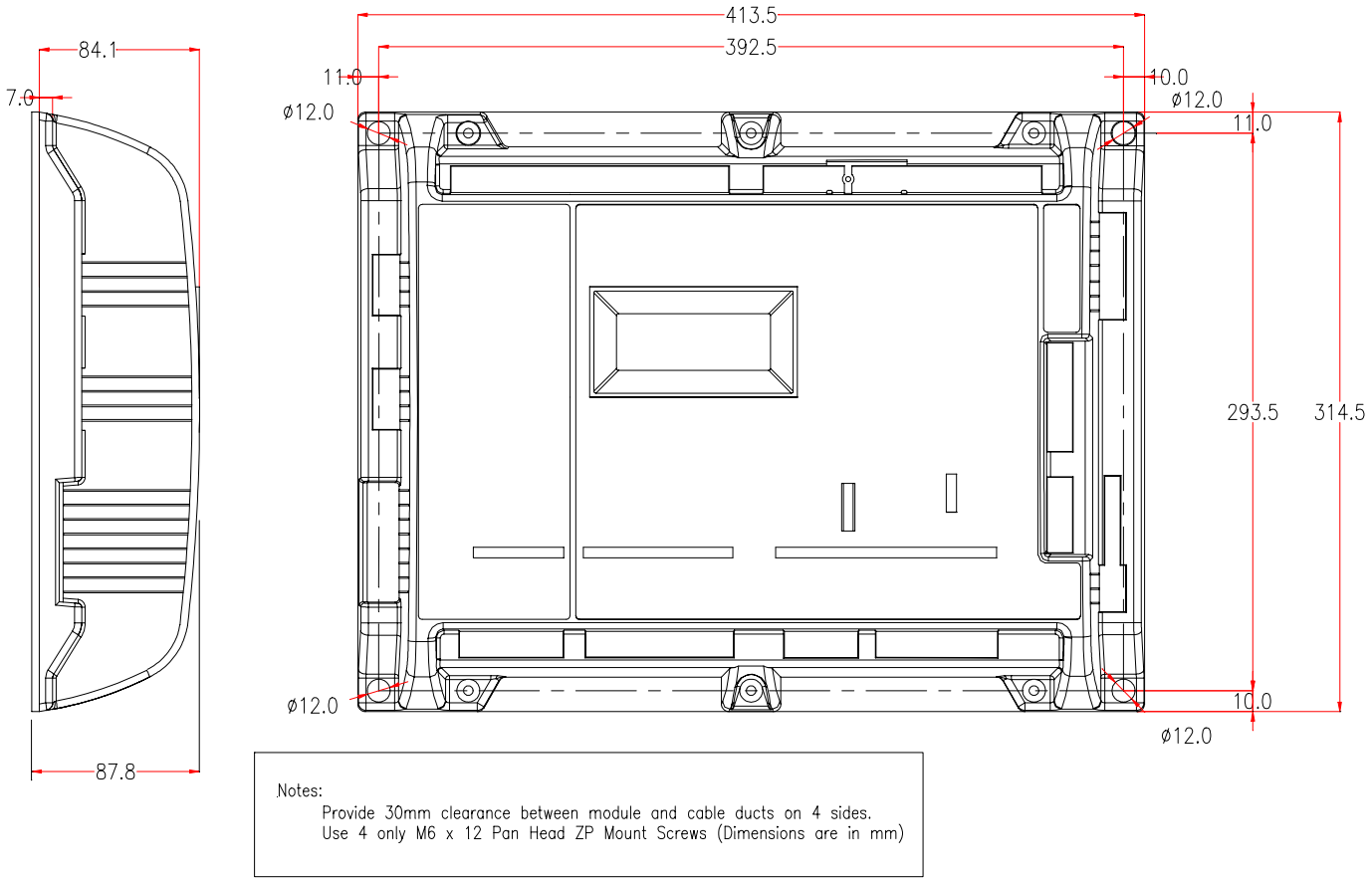
- 1 actuator driver output (may be expanded for multi-valve actuators for larger turbine applications)
- 2 MPU speed sensor inputs
- 16 logic inputs, with LED status indication, of which 12 are user defined for a wide variety of uses, including, "Hot Start", "Sequence Hold", "Speed Raise/Lower", "Voltage Raise/Lower", "Base Load", "Overspeed Test", "Process Enabled", etc.
- 9 relay outputs, with LED status indication, of which 8 are user defined for range of applications

  Typical control functions include:
  - "Turbine Started"
  - "AVR Priming"
  - "Synchronising"
  - "Generator C/B" close & trip
  - "kW & kVAr" switches

  Typical alarm functions include:
  - "Speed Sensor" failure
  - "Loss of Actuator Feedback"
  - "Process Signal" failure
  - "Reverse kW/kVAr" load
  - "High kW/kVAr" load
  - "High/Low Frequency"
  - "High/Low Voltage"
- Individual output relays can have multiple functions by being assigned as "Combined Alarms"
- Each "alarm" can be selected to directly "Trip" the generator C/B
- 4 analogue inputs (3 x 4-20 mA, 1 x RTD) for user selectable applications. E.g. kW, kVAr, & PF load references, process signal & reference, etc.
- 3 analogue outputs (4-20 mA) for direct driving user applications, E.g. kW, kVAr, PF, RPM meters, actuator position, process reference etc.
- Further I/Os expansion is possible via CAN bus

Dimensional drawing

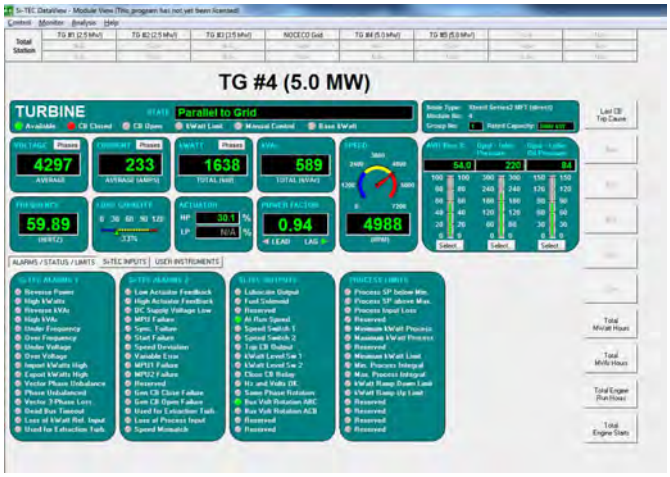
Si-TEC Xtend Physical



Notes:
Provide 30mm clearance between module and cable ducts on 4 sides.
Use 4 only M6 x 12 Pan Head ZP Mount Screws (Dimensions are in mm)

Communications

- RS232 diagnostic port for Si-TEC support software
- "Customer RS485 LAN" has read/write facility for a wide range of registers. Standard LAN protocols are Modbus® RTU and ASCII.
- "Si-TEC LAN" for inter-module communications for up to 24 Si-TEC *Xtend* modules of any type combination
- "CAN Bus" port for CGC to Opal & RIO interface



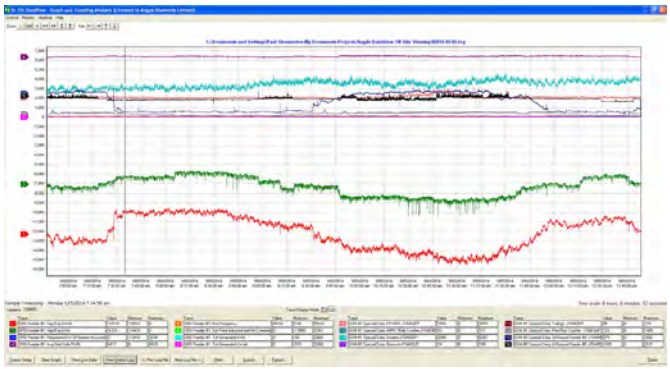
Software tools (Windows® based)

Si-TEC pcConfigure

- Allow storage & retrieval of set point parameters to and from a Si-TEC *Xtend* module via a PC
- Graphical configuration of steam map and linearization curves (HP & LP actuators)
- Operates in a safe controlled environment
- Saves all set point parameters to disk
- Data can be sent by email
- Data can be printed for archival records
- Menu driven set-up & alarm configuration
- Software interface via PC or remote access

Si-TEC pcTune

- Allows generator tuning to be performed remotely and in a controlled environment
- Allows generator tuning to be performed with increased accuracy in true engineering values
- Provides 100 % repeatable results
- Recovery characteristics tested by inducing errors and recording results graphically
- 16 traces of user selected digital values can be selected for display
- Multiple PID tuning menus
- Other displays include "Digital Instrument Panel", "System Overview" and "Live Steam Map"
- Data can be sent by email
- Data can be printed for archival records
- Software interface via PC or remote access



Si-TEC DataView

- High speed power station monitoring system for PC, configurable for up to 24 nodes (including CGC, GSM, ADG, temp scanner, feeders, etc.)
- Includes extensive data logging (up to100 data per node), event recording, and archiving (up to several years)
- Data extracted via Modbus RS485 or Ethernet (Modbus TCP/IP)
- Exporting of log file via CSV format for up to 20 parameters
- Operates independent of PLC/SCADA

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